

## SPECIFICATION

### TITLE OF INVENTION:

Underground Irrigation Systems for Lawn

### CROSS-REFERENCES TO RELATED APPLICATIONS:

United States Patent - 5,374,138, by Byles, on December 20, 1994.

### STATEMENT OF FEDERALLY SPONSORED RESEARCH/DEVELOPMENT:

Not Applicable

### INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON COMPACT DISC:

Not Applicable

### BACKGROUND OF THE INVENTION:

The invention relates to irrigation systems and particularly to a lawn area irrigation system that distributes and emits water below the surface at root level.

Permanently installed lawn and landscape irrigation systems are very popular. Common lawn and landscape irrigation systems include a network of underground tubing which supplies irrigating water to sprinkler heads spaced throughout the area of lawn to be watered.

The most important problem with sprinkler head systems is that such systems make very inefficient use of irrigation water. Also, complete coverage of an area requires that the sprinkler heads be spaced so, that their coverage areas overlap.

Other problems with sprinkler head irrigation systems include the susceptibility of sprinkler heads to damage. Also, spray from the sprinkler heads often discolors fences and adjacent structures.

Furthermore, the deep trenching required for the network of PVC tubing makes installation costs fairly high.

Comparing with the sprinkler head systems, the invention will consume much less water than the perfectly adjusted traditional sprinkler head systems. It delivers moisture right to the roots of grass or plantations and water does not evaporate from the surface of the lawn, especially during the hot weather days.

With this system, if water is diluted with a fertilizer, people will not be exposed to the dangerous chemicals. Regularly, when sprinkler head system sprays that kind of solution, especially when the wind blows, water particles drop on people's skin or on the surfaces that people touch.

It is not necessary to leave the lawn or take another route for a walk during the watering time.

People do not need to wait until surface of the lawn will dry up to play or use for the social activities, or to cut the grass.

Non-potable water can be used and it will not cause any odor or disinfections problems for the property owners. This option will contribute additional savings to the water consumption for the local utility companies.

It allows the irrigation of the lawn even in the afternoon hot sunny hours, when the traditional system can "burn" the grass. Those hours are the most productive in the sense of grass grow, because photosynthesis levels are rapidly increasing and moisture is essential during this process. Because of that, the appearance of lawns with the above described systems will be much more attractive than the lawns irrigated with the traditional sprinkler systems.

Traditional sprinkler head system's electrical valve and control panel for On or Off mode and water flow scheduling can be used for the proposed system.

The system, once installed, does not need to be adjusted and repaired every season, and can work with the existing systems as well.

Drip irrigation systems utilize subsurface water emitters to release irrigating water and avoid many of the problems associated with sprinkler head systems. However, drip irrigation systems are useful only for trees and shrubbery and are inefficient for use in irrigating lawns. The inefficiency arises because drip emitters deliver a major portion of the water to an area too deep to be useful to lawn grasses.

The invention is very convenient and efficient, especially for small lawns.

If system needs to be extended, caps can be removed and new units can be connected to the existing ones. If it is necessary to shrink the existing system, it can be done easily by cutting and capping the pipes.

Today, when the rapidly increasing water consumption becomes huge problem for the society, this system can save tremendous amounts of water (and money) and will improve the ecological situation.

The invention is more convenient for the installation and is different in design from the system invented by Byles (see patent - 5,374,138). It differs fundamentally from Byles in the appearance, details and method of water delivery. My design calls for different type of water emitting conduits with or without synthetic fabric or absorbent material around them. Those materials do not allow water to flow excessively from the conduits and they hold moisture. An environmental substance (top soil) takes moisture directly from the absorbent material's surface. Water emitting conduits connect together to form a unit in a form of square mesh which is easy to install and expand.

#### BRIEF SUMMARY OF THE INVENTION:

It is a general object of the invention to provide a subsurface irrigation system particularly adapted for efficiently irrigating lawn areas. Another object of the invention is to provide a method for efficiently irrigating lawn areas by delivering irrigation water below surface level.

In order to accomplish these objects, an irrigation system according to the invention includes water distributing unit in a form of square mesh with cells. Each unit is approximately 3'x 3' and includes a water emitting conduit.

The water emitting conduits are tubular in shape and capable of emitting water along their entire length.

The method of the invention includes emitting irrigation water from the emitting conduits positioned at an emitting depth below the surface and generally within the root zone of the lawn.

The irrigation system and method according to the invention is much more efficient for lawn irrigation than sprinkler head systems. The most significant improvements are reducing evaporation loss, over spraying and run-off. The subsurface irrigation system, according to the invention, also promotes deep root growth for a healthier, more freeze resistant lawn.

These and other objects, advantages and features of the invention will be apparent from the following description of the preferred embodiments, considered along with the accompanying drawings.

**BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS:**

**VIEW. 1** Typical water distributing unit in a form of square mesh with cells

**VIEW. 2** Water distributing unit's assembly that consists of (4) water distributing units connected to each other with clamps and connected to the water supply line.

**VIEW. 3** Details and section of water impermeable conduit with holes and synthetic fabric around it.

**VIEW. 4** Details and section of spiral tube covered with the synthetic fabric.

**VIEW. 5** Details and section of water emitting conduit made of material that provide both porosity and permeability.

**VIEW. 6** Water emitting conduit embedded in topsoil.

**DETAILED DESCRIPTION OF THE INVENTION:**

**VIEW. 1** is the unit 1 and **VIEW. 2** is the (4) units assembly 2 of underground irrigation system embodying the principles of the invention. The system is designed to irrigate an area A or B and includes a water supply line 7, a header conduit 8, and the water distribution branches 9. Header conduit 8 and the water distribution branches 9 are water emitting conduits. Each water emitting conduit 8 & 9 is adapted to irrigate a single cell coverage zone 10. As it shown unit 1 is in a form of square mesh with cells and made from the water emitting conduits 8 & 9. Water emitting conduits 8 & 9 are capable of emitting water preferably along its entire length. The water emitting conduits 8 & 9 may be any tube of material forming a flow channel along its length. They are capable of carrying water and allowing the water to seep out through the channel walls at a low flow rate. The water emitting conduits 8 & 9 is generally cylindrical in shape and may have a diameter between 1/2" and 1/4".

**VIEW. 3** shows one form of invention where conduit 8 or 9 can be formed from a water impermeable material. It has small holes 16 around it and covered with the synthetic fabric 15 or absorbent material to prevent the clogging the holes with the dirt and roots. Synthetic fabric 15 needs to be strong and tight enough to keep water from splashing from the surface. At the same time, the synthetic fabric 15 should allow water to penetrate it and soak the environmental substance. This view also shows the section 12 and the cap 13 with clamp 14 if outlets 11 are not used.

**VIEW. 4** shows another form of invention where conduit 8 or 9 can be formed from a spiral 16 that covered with the synthetic fabric 15 or absorbent material. Synthetic fabric 15 needs to be strong and tight enough to keep water from splashing from the surface. At the same time, the synthetic fabric 15 should allow water to penetrate it and soak the environmental substance. This view also shows the section 12 and the cap 13 with clamp 14 if outlets 11 are not used.

**VIEW. 5** shows the one more form of invention where conduit 8 or 9 can be formed from a material 6 that includes continuous voids or channels providing both porosity and permeability. This material can be made from the synthetic fabric 15 or absorbent material. In any case, the pores in the conduit material to allow the required seepage should be small enough to prevent the clogging the holes with dirt and roots. This view also shows the section 12 and the cap 13 with clamp 14 if outlets 11 are not used.

VIEW. 6 shows water emitting conduit 8 or 9 positioned at emitting depth below the sod 4 and embedded in top soil 3 in the area to be watered. The emitting depth may commonly be between two and six inches below the soil surface.

The operation and method of the invention may be described with reference to VIEW 1, 2 & 6. After (4) units assembly 2 placed on soil 5 and connected to the main feeding water pipe 7, it needs to be tested.

Water pipe 7 can be connected to the water supply through the existing or new water distribution and control system commonly used for sprinkler system.

During the landscaping, the system needs to be assembled within the borders of the lawn by connecting units 1 to each other using clamps 14. Sleeves 11 that are not used should be closed with caps 13 using clamps 14.

The method of the invention includes emitting water at a subsurface level along the length of the emitting conduits 8 & 9.

The capillary action in the soils allows saturation at root level or in the root zone throughout the single cell coverage zone 10.

Topsoil 3 needs to be placed above the assembled units to provide smooth surface and sod 4 should be placed above the topsoil 3 following that procedure.

The above described views and details are intended to illustrate the principles of the invention, but not to limit the scope of the invention. Various other changes and modifications to these preferred details may be made without departing from the scope of the following claims.

Referring to VIEW 3 & 4, Byles irrigation system (see patent - 5,374,138) without deflector can be utilized for underground irrigation, if water emitting conduits covered with synthetic fabric or absorbent materials are used.

#### ABSTRACT OF THE DISCLOSURE

A subsurface irrigation system that includes one or more units comprising water emitting conduit and absorbent material enveloping it. The water emitting conduit extends through the area to be watered buried at an emitting depth below the surface of the area and is capable of receiving water one end and emitting the water at a low overall rate along its entire length. Absorbent material envelopes the water emitting conduit along its entire length and is capable of absorbing water from emitting locations. Capillary action of the soil draws the absorbed water to saturate significant area only to the depth of the root zone.

#### SEQUENCE LISTING

Not Applicable